SOME FACTORS AFFECTING PROFITS IN SHEEP RAISING IN SOUTHEASTERN OHIO

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The purpose of this study was to learn the effects of various flock-management practices on the costs of and returns from the sheep enterprise and to point out ways in which costs may be decreased and profits increased. Similar studies were conducted in the fine-wool areas of West Virginia and Pennsylvania, and plans are being made for the publication of a bulletin containing additional data from these two states.

The counties selected were typical of that area of southeastern Ohio which has long been recognized as one of the leading fine-wool sections of the United States. During the period of the study covering the three years October 1, 1929 to October 1, 1932 a total of 214 flock records were secured, which were distributed as follows: Morgan county 34, Muskingum 42, Coshocton 29, Guernsey 8, Belmont 38, Harrison 36, and Jefferson county 27. Seventy-seven farmers kept records the first year of the study, 70 of this number co-operated the second year, and 67 furnished data for all three years. Figure 1 shows the area in which the Ohio study was carried on, together with the estimated number of sheep in each county of the state on January 1, 1932. It may be of interest to note here the change that has taken place in the sheep population of these seven counties and of the state as a whole. The following are the numbers of sheep as shown by the Census, excepting the 1930 figures which are Federal-State estimates for January 1 of that year:

	1870	1890	1910	1930
Belmont	162,787	127,801	82,802	29,500
Coshocton	132,173	117,340	106,770	75,300
Guernsey	151,848	128,121	93,690	45,100
Harrison	180,189	156,773	130,148	75,400
Jefferson	154,668	97,930	49,799	18,200
Morgan	78,009	99,222	94,772	72,100
Muskingum	145,954	126,276	118,831	76,800
Total, 7 counties	1,005,628	853,463	676,812	392,400
State total	4,928,635	4,060,729	2,890,163	2,105,000

Description of Farms Studied

For the third year of the study, either a farm account or a farm management survey record was secured from each of 58 of the farms. The average size of these farms was 215 acres - 56 in crops, 140 in pasture and 19 in woods, farmstead and waste land. Of the 56 acres in crops, there was an average of 9.9 acres in corn harvested for grain, 1.8 acres in silage corn, 5.1 acres in oats, 8.3 acres in wheat, 30.0 acres in hay and 0.9 acres in other crops. According to the 1930 Federal Census the average size of all farms in these seven counties was 108 acres; the average size of those farms classed as "animal-specialty farms" was 190 acres, more closely approximating the size of the farms included in the survey.

The farms included in the 3-year study were selected because they were thought to be typical of those farms on which fine-wool sheep are kept. An effort was made to avoid those farms making a practice of exhibiting purebred

Fig. 1. Estimated Number of Sheep on Farms, Jan. 1, 1932, by Counties.
(Shaded area indicates counties included in study)

sheep at fairs or those buying feeder lambs. The average number of sheep on these farms at shearing time in 1932 was 125, this being a few more than the 3-year average. The size of flocks on individual farms ranged from 18 to 370. Dairy products were sold from all but three farms; the average number of milk cows per farm was 7. Twenty-four farms had less than 5 cows, 18 had from 5 to 9, and 16 farms had 10 cows or more. In addition to these, there was an average of 11 head of other cattle and calves per farm. There was an average of approximately 3 work horses per farm and 100 hens. Thirty-eight of the farms sold an average of 16 pigs or shoats each, the number ranging from 4 to 47 on individual farms.

Average cash receipts per farm were $1212; of this amount $338 were from the sale of milk and cream, $137 from sale of cows, calves and all other cattle, $281 from sale of sheep and wool, $251 from poultry and eggs, $72 from hogs, $71 from sale of crops, and $62 from miscellaneous sources. Cash operating expenses averaged $654 per farm, of which taxes accounted for $165, purchase of feeds ranked second averaging $91 per farm, purchased livestock cost $88, and hired labor (an average of 3 months per farm) was next in importance costing $86 per farm. Thus even tho holding their expenditures at a very low figure, these farmers had average net cash receipts of only $558.

Methods of Conducting Study

Flock inventories were taken as of October 1 each year. Conservative values were placed on mature sheep, and lambs were valued according to their weight and market price. These inventories were later adjusted so that sheep of the same age and condition on a given farm were valued at the same figure the beginning and end of the record year. This was found necessary to overcome the effect of the drop in market price, particularly of mature sheep.

Table 1.- Average Feed Prices, Values of Sheep and Wool, and Rates Charged for Pasture and Man Labor

Item	1929-'30	1930-'31	1931-'32	Average
	Dol.	Dol.	Dol.	Dol.
Corn, per bu.	1.00	.85	.35	.71
Oats, per bu.	.58	.47	.28	.46
Bran, per cwt.	2.04	1.48	1.02	1.65
Oilmeal, per cwt.	3.08	2.32	1.97	2.63
Legume hay, per ton	9.18	19.88	9.18	12.18
Mixed hay, per ton	7.96	17.07	4.95	9.97
Timothy hay, per ton	7.37	15.97	4.59	8.44
Corn stover, per ton	2.78	5.80	2.34	3.52
Summer pasture, per head*	.12	.10	.08	.10
Winter pasture, per head	.06	.05	.04	.05
Man labor, per hour	.20	.15	.10	.158
Sheep, per head	5.68	4.41	3.56	4.59
Lambs, per cwt.	6.37	5.75	4.48	5.54
Wool, per lb.	.252	.184	.129	.188

*Rate per head per month for all sheep, excluding young lambs prior to October 1.

Records of feed, labor and other costs together with a record of sales were kept by the farmers in a book provided for the purpose. These reports were checked once or twice during the year. Feeds were figured at conservative farm values in the case of home-grown feeds and at cost for feeds that were purchased. These prices varied somewhat according to local supplies and local market demands. Southeastern Ohio is a deficit grain area where prices, particularly of corn and oats, are higher than elsewhere in the state. The year 1930 will be remembered because of the drought which was especially serious in sections of southeastern Ohio. This accounted for the high prices of hay during the winter of 1930-'31.

In Table 1 are data on average price per unit of some of the more important cost items, together with the average inventory values of sheep and market prices of lambs and wool.

Average Costs of Production

Before taking up in detail the various methods of flock management, data will be presented in Table 2 showing the three-year average costs of carrying a flock of 100 sheep* and the returns therefrom. These are to be taken as averages only, and will not apply under all conditions. Quantities of grain and hay will vary according to the length and intensity of the winter and to the quality of pasture available. Labor will vary according to the size of flock, the time of lambing and the proportion of brood ewes in the flock.

It will be noted that a manure credit was given, amounting to about $20 per 100 sheep. This was estimated at 20 per cent of the value of the grain consumed plus an allowance for legume hay, one ton getting the same credit as 20 bushels of oats. This is an arbitrary method, thought to be more equitable than a flat rate, particularly when comparing flocks receiving mostly timothy hay and little grain with those fed liberal quantities of grain and legume hay. Flock depreciation was negligible. In other words, the increase in value of lambs and yearlings on hand at the beginning of the record year was just offset by depreciation and death loss in the flock.

Systems of Flock Management

Twenty years ago it was common for most sheep raisers of this section to keep their wethers as long as they would produce a profitable fleece. Large flocks could be kept with little care. Relatively few ewes were kept and not much thought was given to the raising of lambs. Wool was of prime importance. Then with decreases in the price of wool and the prevalence of good market prices for lambs there was a decrease in the numbers of wethers kept and more thought was given to the raising of lambs. But fine-wool lambs did not always bring satisfactory returns; so at about the time of this study a number of flock owners were beginning to cross breed a part or all of their fine-wool ewes with mutton-type rams to produce lambs that would help to compensate for some of the drop in the price of wool that was taking place.

All degrees of intensity of management were found on these farms, ranging from the keeping of wethers, the feeding of no grain and the raising of barely enough lambs to maintain the number of sheep in the flock even the none were sold, to the keeping of no sheep other than the well fed breeding flock and the production of winter or "hot house" lambs, all sold by Easter or thereabouts.

*Number of sheep, as referred to in the following tables, is the total number shorn.

Table 2.- Annual Costs and Returns per 100 Sheep, 3 Year Averages 1930-1932

Item	Amount	Value	
		Per Unit	Total
		Dol.	Dol.
Costs:			
Feed and pasture:			
Shelled corn	3,360 lb.	1.27 per cwt.	42.74
Oats	1,471 lb.	1.44 per cwt.	21.21
Bran	232 lb.	1.65 per cwt.	3.83
Oil meal	57 lb.	2.63 per cwt.	1.50
Total grain	5,120 lb.	1.35 per cwt.	69.28
Legume hay	6,070 lb.	12.18 per ton	36.98
Mixed hay (about 40% clover)	7,297 lb.	9.97 per ton	36.39
Timothy hay	7,151 lb.	8.44 per ton	30.20
Corn stover	1,299 lb.	3.52 per ton	2.29
Total dry roughage	21,817 lb.	9.70 per ton	105.86
Silage	1,262 lb.	4.50 per ton	2.84
Pasture	66 A.	1.20 per A.	79.30
Total feed and pasture			257.28
Man labor	259 hr.	.158 per hr.	40.82
Building charge			46.45
Interest on sheep @ 5%			22.93
Taxes on sheep			6.69
Shearing			15.14
Twine	5.2 lb.	.14 per lb.	.73
Salt	259 lb.	.94 per cwt.	2.42
Drenching materials			.47
Equipment			.73
Use of automobile			1.23
Horse work	5 hr.	.12 per hr.	.64
Other miscellaneous			1.99
Total Costs			397.52
Income:			
Wool	944 lb.	.188 per lb.	177.77
Lambs	43 head	2.93 per head	125.96
Manure			20.27
Gross income			324.00
Less flock depreciation			3.34
Total returns			320.66

Wethers as a factor affecting costs and returns.- The term "wethers" as used here includes only those which were kept after their first shearing. Those wether lambs fattened during the winter, shorn, and then sent to market are not classed as wethers. More than two-thirds of these farmers raised only fine-wool lambs, there being 154 of such records out of the total of 214. These 154 flocks were grouped according to the percentage of wethers in the flock, and the results shown in Table 3. Eighty-one of these had no wethers, and seventy-three had varying proportions running up to as high as 54 per cent of the total number of sheep in one flock.

Table 3.- Keeping of Wethers as Related to Costs and Returns, 3 Year Averages (Flocks raising only fine-wool lambs)

Item		Per cent which wethers were of total sheep shorn		
		0	1 to 20	21 and over
Number of flocks	No.	81	37	36
Sheep per flock (number shorn)	No.	99	140	136
Wethers per 100 sheep	No.	0	12	31
Ewes per flock	No.	57	65	46
Ewes per 100 sheep	No.	58	46	34
Per cent of ewes lambing	Pct.	91	86	81
Lambs raised per 100 ewes bred	No.	83	76	70
Lambs raised per 100 sheep	No.	48	35	24
Grain fed per sheep	Lbs.	56	46	32
Dry roughage per sheep	Lbs.	217	201	199
Pasture per sheep	Acres	.64	.60	.69
Man labor per sheep	Hrs.	2.58	2.41	2.23
Annual costs per sheep				
Feed and pasture	Dol.	2.66	2.35	2.17
Labor	Dol.	.40	.39	.37
Buildings	Dol.	.50	.43	.42
Interest on sheep	Dol.	.24	.22	.20
Miscellaneous	Dol.	.31	.29	.29
Total costs	Dol.	4.11	3.68	3.45
Average weight of lambs, Oct. 1*	Lbs.	53.2	50.5	48.5
Average value per lamb, Oct. 1*	Dol.	2.73	2.43	2.33
Lamb income per sheep	Dol.	1.31	.86	.55
Total income per sheep	Dol.	3.51	2.72	2.23
Costs less income other than wool	Dol.	2.44	2.76	2.98
Wool per sheep	Lbs.	10.00	9.21	9.02
Cost per pound of wool	Dol.	.244	.300	.330

*Including those sold before October 1.

There were some significant differences in these three groups of flocks. Those without wethers had a smaller number of sheep on the average but a greater proportion of brood ewes. The number of lambs raised per 100 ewes bred gives indication of the better care given in general to those flocks which contained no wethers. This better lambing percentage was secured in spite of the greater average number of ewes in the flock and even tho their average date of lambing was 20 days earlier. Every item making up the annual cost of keeping a sheep was

higher in flocks without wethers and decreased as the proportion of wethers increased. But with an increasing percentage of wethers, income per sheep decreased and even more rapidly than costs. Lambs in flocks in which the most wethers were kept were smaller and less valuable per head and only one-half as many were raised for every 100 sheep as compared with those in flocks with no wethers.

What kind of a picture do we have when wethers alone are considered? Costs of keeping wethers in the 36 flocks where wethers were more than 20 per cent of the total number of sheep are presented in Table 4. A total of 1505 wethers are included here. Data are also given for the other sheep on these same farms.

Table 4.- Costs and Returns per Wether and Other Sheep in Flocks having more than 20 Per Cent Wethers, 36 Flocks, 3 Year Averages

Item		Wethers	Other Sheep
Grain per sheep	Lbs.	22	36
Dry roughage per sheep	Lbs.	211	194
Man labor per sheep	Hrs.	1.93	2.36
Annual costs per sheep			
Feed and pasture	Dol.	1.91	2.30
Labor	Dol.	.30	.39
Building charge	Dol.	.41	.44
Interest	Dol.	.16	.22
Miscellaneous	Dol.	.27	.30
		3.05	3.65
Total income per sheep	Dol.	1.73	2.45
Lamb income per sheep	Dol.	0	.80
Wool cost per sheep	Dol.	3.18	2.89
Wool per sheep	Lbs.	9.62	8.76
Cost per pound wool	Dol.	.331	.329

It will be noted that the annual cost of keeping a wether was $3.05, as compared with $3.65 per head for the other sheep on the same farms and $4.11 per sheep in flocks which had no wethers. But the income from wethers was only $1.73 per head, whereas income per sheep in flocks without wethers was $3.51. (See Table 3) Wethers had fleeces averaging 9.62 pounds, this being somewhat better than the average of all fleeces produced. The other sheep in these 36 flocks containing more than 20 per cent wethers had fleeces averaging 8.76 pounds. The fleece-weight advantage which wethers had over other sheep from the same farm ranged from 1.8 pounds to practically nothing, depending largely on the proportion of lamb fleeces, age of wethers and condition of ewes. And so in spite of the fact that wethers have only one major source of income, their wool cost per pound is seen to be almost identical with the other sheep in the same flocks. Wethers were found to be maintained at a lower cost per head than other sheep on the same farms but their presence was accompanied by a low quality of management as evidenced by the smaller number of lambs raised per 100 ewes and the lighter fleeces produced by the other sheep as compared with flocks containing no wethers at all.

Wethers have no place on farms that can support only a small flock. But on the large farm which has an abundance of rough pasture, plenty of non-salable roughage and sufficient shelter, but a shortage of grain and labor, a flock of wethers will add to the total receipts of the farm with little outlay of cash or labor. With increasing wool prices they may be looked upon with more favor. But they should be regarded only as a supplementary part of the sheep enterprise and then only after the ewe flock is built up to capacity and given the care necessary to produce a good clip of wool and a good crop of lambs.

Fine-wool lambs vs. cross-bred lambs.- On approximately 25 per cent of the farms surveyed, cross-bred lambs were raised in 1930 and the practice increased during the period of the study. One-third of the farms had cross-bred lambs in 1932. Shropshire rams were used in more than 60 per cent of the cases, Dorsets and Southdowns ranking next in numbers used. Some of the larger flock owners divided their ewe flocks, breeding part to a mutton-type ram for market lambs and the best ewes to a Delaine or C-type ram, saving the ewe lambs from this mating for replacement purposes. The older brood ewes were almost always selected for cross-breeding purposes, experience having shown them to be more satisfactory dams for the larger lambs. Out of the total of 214 flock records secured, 60 had cross-bred lambs in part or entirely. Only 45 of these records were used in Table 5. Fifteen flocks in which wethers were kept were omitted in order to eliminate any effect which wethers might have on the results. Likewise 73 all fine-wool flocks containing wethers were excluded.

Those raising all cross-bred lambs had small flocks with a high percentage of brood ewes as compared with those raising fine-wool lambs. In the cross-bred flocks outstanding success was attained in raising 96 lambs for every 100 ewes bred in spite of the fact that most of these were early lambs. These lambs are naturally more vigorous at birth, and better feeding of the ewe flock resulted in a larger number of twins and a lower mortality. Flocks which were divided for breeding purposes did not show up as well as expected in this regard, due possibly to the larger average size of flock and more especially to the lower level of grain feeding. Sheep in flocks producing all cross-bred lambs received more than twice as much grain per head as did those in the other two groups of flocks. The factors of heavier feeding, smaller flocks and earlier lambs necessitated considerable more care per sheep in flocks raising all cross-bred lambs; here 4.03 hours of man labor were used as compared with 2.58 hours per sheep in flocks producing only fine-wool lambs. Costs per sheep were less with the flocks raising all fine-wool lambs. Those with part cross-bred and part fine-wool lambs were kept at nearly as low a cost. Labor and shelter costs per sheep are less in large flocks.

More than one-half of the cross-bred lamb crop was disposed of before October 1, the end of the record year, as compared with only about 10 per cent of the fine-wool lambs. And there was a considerable difference in average selling prices, the cross-bred lambs bringing $8.28 per hundred pounds, the fine wools only $4.77. Including those sold with those on hand at the end of the record year, the lamb credit per sheep was found to be more than two and a quarter times as much with cross breeding as with straight Delaine breeding. And thus cross-breeding afforded not only opportunity for utilizing more feed and winter labor but also provided a larger income from a given number of sheep. The total income from the average flock of 65 sheep under this method was practically the same as from a hundred sheep under the fine-wool lamb system.

Table 5.- Cross-bred Vs. Fine-wool Lambs, 3 Year Averages
(Excluding all flocks in which wethers were kept)

Item		Type of lambs raised		
		All cross-bred	Part cross-bred	All fine-wool
Flocks	No.	25	20	81
Sheep shorn per flock	No.	65	166	99
Ewes per flock	No.	52	91	57
Ewes per 100 sheep	No.	75	55	58
Per cent of ewes lambing	Pct.	92	88	91
Lambs raised per 100 ewes bred	No.	96	84	83
Lambs raised per 100 sheep	No.	78	52	48
Per cent of lambs cross-bred	Pct.	100	53	0
Grain fed per sheep	Lbs.	113	53	56
Dry roughage per sheep	Lbs.	266	259	217
Pasture per sheep	Acres	.74	.70	.64
Man labor per sheep	Hrs.	4.03	2.66	2.58
Annual costs per sheep:				
Feed and pasture	Dol.	3.65	2.84	2.66
Labor	Dol.	.64	.40	.40
Building charge	Dol.	.60	.46	.50
Interest on sheep	Dol.	.28	.24	.24
Miscellaneous	Dol.	.33	.29	.31
Total costs	Dol.	5.50	4.23	4.11
Per cent of lambs sold before Oct. 1	Pct.	52.1	39.4	10.7
Average price per cwt. lambs sold	Dol.	8.28	8.06	4.77
Average value per cwt. all lambs*	Dol.	6.70	6.27	5.13
Average weight of lambs, Oct. 1*	Lbs.	56.8	55.2	53.2
Average value per lamb, Oct. 1*	Dol.	3.81	3.46	2.73
Lamb income per sheep	Dol.	2.96	1.81	1.31
Total income per sheep	Dol.	5.10	3.66	3.51
Costs less income other than wool	Dol.	2.19	2.16	2.44
Wool per sheep	Lbs.	9.54	9.25	10.00
Cost per pound of wool	Dol.	.229	.234	.244

*Including those sold before October 1.

There are a number of disadvantages of the cross-breeding system, chief among which is the problem of securing replacement ewes. This uncertainty kept a number of these fine-wool flock owners, who had spent years in breeding for wool production, from shifting to cross-breeding. Another disadvantage is that warmer buildings and more and better feeds are necessary for the production of winter lambs. One advantage commonly referred to, in addition to the better income, is the fact that these lambs do not conflict with spring field work, and since they are disposed of at an early date present no problem during a period of pasture shortage.

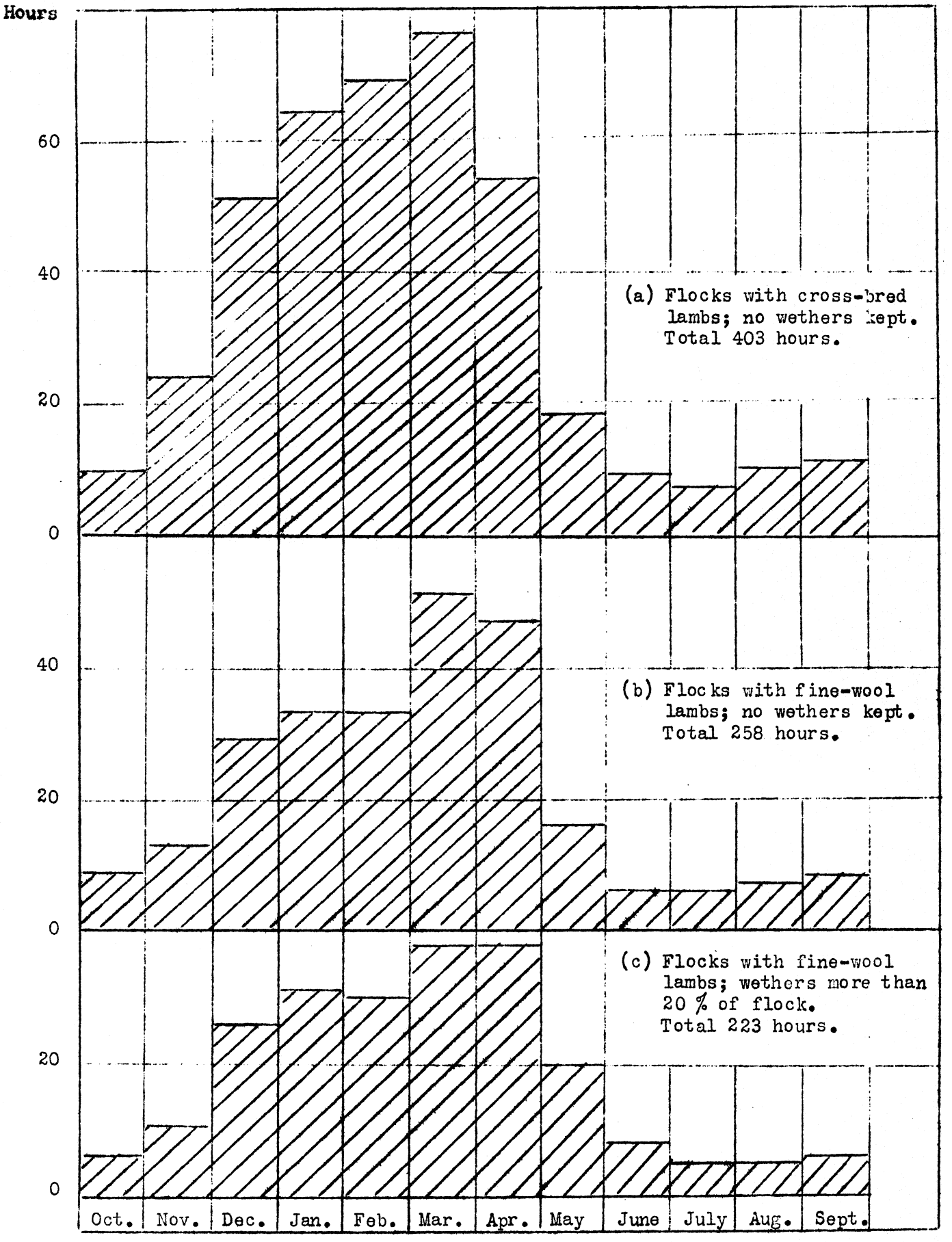

Fig. 2. Distribution of Labor on 100 Sheep.

Labor distribution on sheep.- The work of caring for sheep is seasonal in nature, the large part of it falling between December 1 and May 1. From June to December the work is light, consisting of occasional jobs such as salting, changing from one pasture to another, and drenching for stomach worms. Figure 2 shows the distribution of labor on three types of flocks: (a) producing all cross-bred lambs and not keeping wethers, (b) all fine-wool lambs and no wethers, and (c) all fine-wool lambs and with wethers making up more than 20 per cent of the flock.

The flocks used for cross breeding were started on feed earlier in the fall, as indicated by the larger amount of work done in November. The greatest difference between the two extreme types of flocks as to labor distribution was in the months of February and March. In the upper group the average lambing period was from February 14 to April 10, in the middle group it was from March 20 to April 26, while in the lower group many lambs were dropped on pasture, the average lambing season being April 13 to May 13.

The lamb crop as related to costs and returns.- The importance of raising a large number of lambs per 100 ewes is pointed out in Table 6, in which all records were grouped according to this factor. Flocks with the highest

Table 6.- Lambs Raised per 100 Ewes and Other Related Factors, 3 Year Averages

Item		Number of lambs raised per 100 ewes bred			All farms
		75 or less	76 to 90	91 and over	
Number of flocks	No.	69	77	68	214
Sheep per flock	No.	124	123	100	116
Number of ewes bred	No.	63	64	56	61
Ewes per 100 sheep	No.	51	52	56	53
Per cent of ewes lambing	Pct.	79	90	96	88
Lambs raised per 100 ewes bred	No.	65	82	100	82
Lambs raised per 100 sheep	No.	33	42	56	43
Wethers per 100 sheep	No.	14	9	7	10
Deaths mature sheep per 1000	No.	60	44	35	47
Grain fed per sheep	Lbs.	46	49	61	51
Dry roughage per sheep	Lbs.	221	211	224	218
Per cent legume hay	Pct.	34	43	51	42
Silage per sheep	Lbs.	3	17	18	13
Total feed and pasture per sheep	Dol.	2.37	2.57	2.83	2.57
Man labor per sheep	Hrs.	2.42	2.58	2.82	2.59
Total cost per sheep	Dol.	3.74	3.97	4.27	3.98
Average value per lamb, Oct. 1*	Dol.	2.53	2.75	3.42	2.93
Lamb income per sheep	Dol.	.83	1.16	1.93	1.26
Total income per sheep	Dol.	2.58	3.18	4.04	3.21
Costs less income other than wool	Dol.	2.91	2.54	2.03	2.55
Wool per sheep	Lbs.	9.09	9.29	10.08	9.44
Cost per pound of wool	Dol.	.320	.273	.201	.270

*Including those sold before October 1.

lambing percentage had less sheep than the average, and a slightly higher proportion of ewes. The figures on per cent of ewes lambing and lambs raised per 100 ewes indicate the difference in care given the ewe flocks prior to and following the breeding season as well as a difference in mortality among the lambs. Occasionally a ram proved to be a non-breeder. But the raising of a good percentage of lambs cannot be attributed to luck entirely. The ewes in the high percentage group were better fed and more of them dropped living lambs. These lambs were more vigorous at birth and were nourished with a better supply of milk. The difference in feeding and care is even reflected in the mortality rate among the mature sheep.

Total cost per sheep in the group raising 100 lambs for every 100 ewes bred was not greatly in excess of that for the group with a 65 per cent lamb crop. But note the difference in income per sheep. Not only were the lambs in the high percentage group worth more per head, but the fleeces in this group were a pound heavier on the average. When income other than wool is subtracted from costs and the remainder considered as cost of producing wool, this is found to be 20 cents per pound in case of the group with 100 per cent lamb crop and 32 cents with those securing only a 65 per cent yield.

Weight of fleece.- The effect of securing a good wool clip is indicated in Table 7. The records were arranged according to weight of fleece and divided each year into three approximately equal groups, this being necessary because of a 1.2 pound variation in the average weight of fleece in 1930 and 1931.

Table 7.- Wool per Sheep and Other Factors, 3 Year Averages

Item		Flocks grouped according to weight of fleece: Light	Medium	Heavy
Number of flocks	No.	71	71	72
Sheep per flock	No.	135	114	100
Wool per sheep	Lbs.	8.35	9.41	10.92
Per cent of ewes lambing	Pct.	87	87	92
Lambs raised per 100 ewes bred	No.	79	80	87
Lambs raised per 100 sheep	No.	41	43	45
Per cent of lambs cross-bred	Pct.	28	29	20
Wethers per 100 sheep	No.	12	10	9
Grain per sheep	Lbs.	46	51	59
Dry roughage per sheep	Lbs.	224	209	221
Per cent legume hay	Pct.	35	46	48
Man labor per sheep	Hrs.	2.56	2.49	2.77
Total costs per sheep	Dol.	3.93	3.86	4.17
Total income per sheep	Dol.	2.75	3.12	3.91
Costs less income other than wool	Dol.	2.76	2.54	2.28
Cost per pound of wool	Dol.	.330	.270	.209

Here again a good wool clip and a good lamb crop go hand in hand. At least one is secured without sacrificing the other. It is only reasonable to expect that conditions favoring the development of the unborn lamb, i.e., a large, thrifty ewe, well fed, and sheltered properly, will also result in the growth of a long fiber and heavy fleece of wool. Annual costs per sheep were not greatly different in the three groups, but the heavy fleeced sheep producing 30 per cent more wool, made an income totaling 42 per cent more than the sheep producing light fleeces. Had the owners of the heavy fleeced sheep sold wool at 21 cents per pound they would have been reimbursed for all items of cost, including interest. To have broken even the owners of the light wooled flocks should have received 33 cents per pound.

Size of flock and other related factors.- All flock owners are aware of the larger amount of labor necessary to care for a given number of sheep when only a small flock is kept. But what of the other costs? In Table 8 it will be noted how intensity of management decreases as size of flock increases. Thus with an increase in number of sheep the proportion of breed ewes was decreased considerably, and less success was achieved in raising the lamb crop. In the small flocks more of the lambs raised were cross-bred.

Table 8.- Size of Flock and Other Factors, 3 Year Averages

Item		Number of sheep shorn			
		1-50	51-100	101-150	151 and over
Number of flocks	No.	31	73	66	44
Sheep per flock	No.	38	77	125	224
Number of ewes bred	No.	25	49	60	108
Ewes per 100 sheep	No.	66	64	48	48
Per cent of ewes lambing	Pct.	90	91	87	87
Lambs raised per 100 ewes bred	No.	88	85	79	80
Lambs raised per 100 sheep	No.	58	54	38	38
Per cent of lambs cross-bred	Pct.	52	40	12	21
Wethers per 100 sheep	No.	3	4	14	11
Inventory value of sheep per head	Dol.	5.30	4.66	4.72	4.34
Grain per sheep	Lbs.	67	66	44	47
Dry roughage per sheep	Lbs.	240	233	236	192
Pasture per sheep	Acres	.74	.69	.67	.62
Total feed and pasture per sheep	Dol.	3.06	2.83	2.58	2.36
Man labor per sheep	Hrs.	4.18	3.03	2.69	2.07
Building costs per sheep	Dol.	.65	.58	.45	.39
Total costs per sheep	Dol.	4.96	4.41	4.04	3.56
Wool per sheep	Lbs.	10.84	9.73	9.30	9.22
Average value per lamb, Oct. 1	Dol.	3.14	3.06	2.92	2.81
Lamb income per sheep	Dol.	1.81	1.67	1.11	1.08
Total income per sheep	Dol.	4.20	3.58	3.10	2.96

It will be noted how quantities of grain and hay fed per sheep were reduced as numbers of sheep increased, and even how less pasture was provided. More than twice as much labor was required per sheep in the smallest as in the largest flocks. In other words, an average large flock of 224 sheep was cared

for with a little less than 3 times as much labor as a small flock having only 38 head. And almost similarly were the large flocks more economical in the use of buildings; undoubtedly the large flocks utilized the space provided them more fully, while the small flocks raising cross-bred lambs had more substantial and warmer buildings.

As a result of a higher plane of feeding, the small flocks produced heavier fleeces and likewise lamb credits per sheep were better. Thus income as well as costs decreased as size of flock increased. But there was no correlation between size of flock and profit per sheep. The large low-cost flocks came nearest to paying their way, while the small flocks ranked next best when considered on a per-head basis. The flocks having between 100 and 150 sheep made the poorest showing, but it will be noted that these had the lowest percentage of cross-bred lambs and the highest percentage of wethers of any group.

Some opinions expressed by those keeping records:

The farmers were asked a number of questions concerning their present farm organization and the reasons why certain changes had or had not been made. When asked what factors limited the number of sheep being kept, inadequate pasture was mentioned more often than any other one item. Low profits from sheep, lack of building space, and shortage of hay ranked next as reasons why more sheep were not kept. Other factors were shortage of grain supply, age of operator and condition of fences.

Farmers who were keeping less sheep than formerly gave change to dairy farming as the principal reason. As expressed by one farmer "a farm fully stocked with sheep yields too low an income for a decent standard of living." A considerable number of cooperators stated the quite evident fact that pastures were not as productive as they once were. Age of operator, migration of sons away from home, loss due to dogs, and poor condition of fences were each mentioned in a number of cases.

One of the more important factors limiting the number of breed ewes in proportion to the total number of sheep was expressed as lack of shelter for any additional ewes. Several said that their nearest sheep barn could accomodate only a certain number of ewes, and that the other barn or barns were too far away. Several said they had plenty of spring work without keeping any more ewes, while shortage of legume hay was also mentioned in several instances. The above are all closely associated with the keeping of wethers. Additional reasons advanced for keeping wethers were: failure to market wether lambs to advantage, utilization of surplus pasture at considerable distance from home, and additional income with little expense.

Those who changed to cross-breeding and those who discontinued the keeping of wethers gave "more profit" as their principal reason in all cases.

Summary of factors affecting profits.- It will be recalled that the price of wool declined rapidly during the period of the study, the average price received being only $0.188 per pound. The average price of all grain fed to sheep was $1.35 per hundred pounds and, largely as a result of the drought in 1930, the average price of hay was $10.00 per ton. Most flock owners would infer that any profit in sheep kept under such conditions would be entirely impossible. It will be of interest, therefore, to note that ten farmers in this group did make a profit on their flocks. How these ten flocks compared with an equal number making the poorest showing may be seen in Table 9.

Table 9.- Comparison of 10 Most Profitable and 10 Least Profitable Flocks, 3 Year Averages

Item		10 most profitable flocks	10 least profitable flocks	All flocks
Number of flock-year records	No.	30	30	214
Sheep shorn per flock	No.	117	108	116
Number of ewes bred	No.	69	48	61
Ewes per 100 sheep	No.	59	44	53
Per cent of ewes lambing	Pct.	93	82	88
Lambs raised per 100 ewes bred	No.	91	68	82
Lambs raised per 100 sheep	No.	54	30	43
Wethers per 100 sheep	No.	0	15	10
Deaths mature sheep per 1000	No.	25	76	47
Inventory value of sheep per head	Dol.	5.14	4.10	4.59
Grain fed per sheep	Lbs.	82	47	51
Dry roughage per sheep	Lbs.	212	245	218
Per cent legume hay	Pct.	47	33	42
Feed and pasture per sheep	Dol.	2.81	2.51	2.57
Man labor per sheep	Hrs.	2.3	2.8	2.6
Total costs per sheep	Dol.	4.14	3.89	3.98
Per cent of lambs cross-bred	Pct.	28.6	17.0	26.1
Per cent of lambs sold before Oct. 1	Pct.	20.3	4.4	21.6
Average value per lamb, Oct. 1*	Dol.	3.36	2.37	2.93
Lamb income per sheep	Dol.	1.81	.72	1.26
Total income per sheep	Dol.	4.48	2.24	3.21
Costs less income other than wool	Dol.	1.60	2.26	2.55
Wool per sheep	Lbs.	10.70	8.61	9.44
Cost per pound of wool	Dol.	.15	.38	.27

* Including those sold before this date.

Both groups of flocks did not vary greatly in size from the average of the 214 flocks. It will be noted that the most profitable flocks contained the higher proportion of brood ewes, and conversely these flocks were entirely without wethers. Seven of the ten low-profit flocks had wethers, however. The high-profit group had much the better success in raising lambs. This, coupled with a higher proportion of brood ewes, enabled these men to raise 80 per cent more lambs for a given number of sheep than those having the least profitable flocks. As a means of showing the importance of parasite control, these farmers who followed adequate or recommended control measures were given a grade of 100 per cent, those who did not drench for stomach worms a grade of zero. On this basis the high-profit group secured an average rating of 70 per cent, the low-profit group a rating of 35. The least profitable flocks suffered three times as high a mortality rate among the mature sheep as the other group.

The owners of the better paying flocks fed 75 per cent more grain per head and a better grade of roughages; this enabled them to be more economical in the use of hay, the largest single item in the cost of keeping sheep during

this period. A better arrangement of barns and feedlots enabled those men to tend their sheep with less labor than those owning the low-profit flocks.

It may be of interest to note that the average lambing period of the high-profit flocks was February 22 to April 15, and that for the low-profit group the average dates were April 7 to May 11. The lateness of lambing in the latter group offset any increased income that might have accrued from the raising of cross-bred lambs. The effect of early lambing in the first group is reflected in the average value per lamb raised. The high-profit flocks produced more than 2 pounds additional wool per fleece and all in all their total income was exactly twice as great as the other group.

Some of the factors contributing to the success of individual sheep raisers might be summarized as follows: (1) A large lamb income per 100 sheep. This is secured thru better feeding, culling and care of the ewe flock; the use of vigorous rams; a high proportion of large, thrifty brood ewes and conversely a low percentage of wethers; cross breeding for those farmers equipped for it; early lambing; keeping the lambs in a thrifty condition thru feeding of ewes, good pasture, and parasite control; and early marketing of lambs. (2) Heavy fleece production, secured thru better feeding, adequate shelter especially during unfavorable weather and breeding for wool production, i.e., ram selection and ewe culling. (3) Lower carrying costs per sheep - thru maintenance of larger flocks, more efficient barn and pasture arrangement and reduction in feed requirements thru use of legume hays and adequate pasture. (4) Low mortality among sheep, attained thru a high plane of feeding, care especially at lambing time, and parasite control.